

# Announcements

Monday, March 02, 2009

Ch 6 MC is due Monday, Mar 9.

**Quiz 2** is on Monday, March 9, covering the last bit of chapter 5 (polyatomic name, formula, charge memorized!) and chapter 6 (6.1-6.7 assigned).

**Exp 14** is this week.

Discussion assignment 1 is posted in D2L discussion boards - your main post is due before class Mon, March 9. Replies will be due a few weeks after that.

4.5 mol H<sub>2</sub>O contains how many H<sub>2</sub>O molecules?

$$4.5 \text{ mol H}_2\text{O} \times \frac{6.022 \times 10^{23} \text{ H}_2\text{O molecules}}{1 \text{ mol H}_2\text{O}} = 2.7 \times 10^{24} \text{ H}_2\text{O molecules}$$

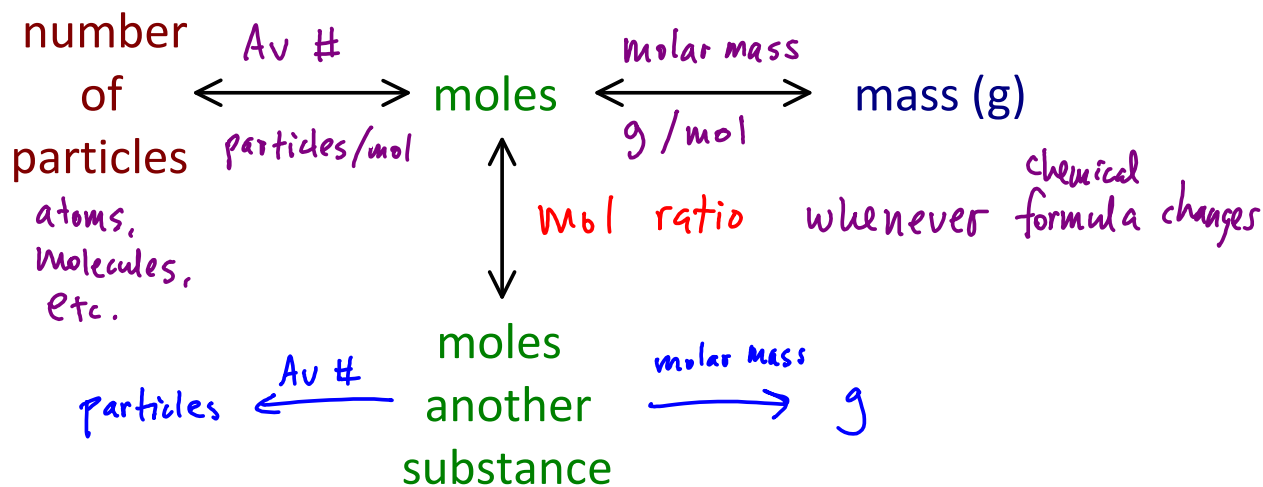
1 mol H<sub>2</sub>O contains 2 mol H and 1 mol

4.5 mol H<sub>2</sub>O contains how many H atoms?

$$4.5 \text{ mol H}_2\text{O} \times \frac{2 \text{ mol H}}{1 \text{ mol H}_2\text{O}} \times \frac{6.022 \times 10^{23} \text{ H atoms}}{1 \text{ mol H}} = 5.4 \times 10^{24} \text{ H atoms}$$

mol ratio

## Calculations with mole ratio



10.0 g NaCl contains how many grams Na?

$$g\ NaCl \rightarrow mol\ NaCl \rightarrow mol\ Na \rightarrow g\ Na$$

$$10.0\ g\ NaCl \times \frac{1\ mol\ NaCl}{58.44\ g\ NaCl} \times \frac{1\ mol\ Na}{1\ mol\ NaCl} \times \frac{22.99\ g\ Na}{1\ mol\ Na} =$$

$$3.93\ g\ Na$$

4.9 g K<sub>2</sub>CO<sub>3</sub> contains how many grams K?

$$g\ K_2CO_3 \rightarrow mol\ K_2CO_3 \rightarrow mol\ K \rightarrow g\ K$$

$$4.9\ g\ K_2CO_3 \times \frac{1\ mol\ K_2CO_3}{138.21\ g\ K_2CO_3} \times \frac{2\ mol\ K}{1\ mol\ K_2CO_3} \times \frac{39.10\ g\ K}{1\ mol\ K} = 2.8\ g\ K$$

*only place we use subscripts from formula*

*MM always per 1 mol*

More calculations

How many oxygen atoms are in 2.85 g Fe<sub>2</sub>O<sub>3</sub>?

$$2.85 \text{ g Fe}_2\text{O}_3 \times \frac{1 \text{ mol Fe}_2\text{O}_3}{159.7 \text{ g Fe}_2\text{O}_3} \times \frac{3 \text{ mol O}}{1 \text{ mol Fe}_2\text{O}_3} \times \frac{6.022 \times 10^{23} \text{ O atoms}}{1 \text{ mol O}}$$
$$= \boxed{3.22 \times 10^{22} \text{ O atoms}}$$

How many grams of Cu<sub>2</sub>O can be formed from 12.0 g of copper?

$$12.0 \text{ g Cu} \times \frac{1 \text{ mol Cu}}{63.55 \text{ g Cu}} \times \frac{1 \text{ mol Cu}_2\text{O}}{2 \text{ mol Cu}} \times \frac{143.1 \text{ g Cu}_2\text{O}}{1 \text{ mol Cu}_2\text{O}} =$$

$$\boxed{13.5 \text{ g Cu}_2\text{O}}$$

2:1 ratio      Cu<sup>+</sup> / O<sup>2-</sup> → copper (I) oxide

## Mass percent composition

**Mass percent composition**: what percent of a compound's total mass comes from each element?

What is the mass % P in  $\text{Ca}_3(\text{PO}_4)_2$ ?

Write out the compound's molar mass calculation:

$$\begin{array}{rcl} 3(\text{Ca}) & = & 3(40.08) \\ 2(\text{P}) & = & 2(30.97) \\ 8(\text{O}) & = & 8(16.00) \\ \hline & & 310.18 \text{ g/mol } \text{Ca}_3(\text{PO}_4)_2 \end{array}$$

What is the mass of 1 mol  $\text{Ca}_3(\text{PO}_4)_2$ ?

$$310.18 \text{ g } \text{Ca}_3(\text{PO}_4)_2$$

What's the mass of P in 1 mol of  $\text{Ca}_3(\text{PO}_4)_2$ ?

$$2(30.97 \text{ g}) = 61.94 \text{ g P}$$

$$\text{Mass \%} = \frac{\text{element mass}}{\text{total compound mass}} \times 100\%$$

$$= \frac{61.94 \text{ g P}}{310.18 \text{ g cpd}} \times 100\% = \boxed{19.97\% \text{ P}}$$

What's the mass % Na in NaCl, NaBr, and  $\text{Na}_2\text{S}$ ?

$$\text{Na}_2\text{S} \quad \% = \frac{2(22.99 \text{ g})}{2(22.99) + 32.07 \text{ g}} = \frac{45.98 \text{ g}}{78.05 \text{ g}} \times 100\% = \boxed{58.91\%}$$